BRAUDE
College of Engineering, Karmiel

Detection of Rare Coins

Software Engineering Department

Braude College

Capstone Project Phase A – 61998

By Hassan Said Ahmad
Lev Leyfer

Supervisor: Zeev Frenkel

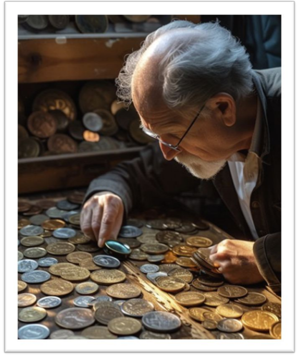
Introduction

- Brief overview of rare coin detection.
- Importance of AI in solving this problem.
- Research objectives.

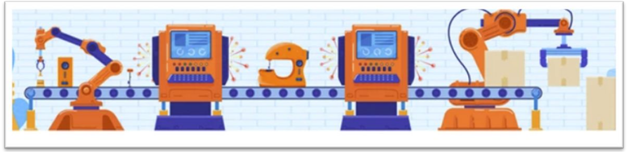
Problem Statement

Challenges in rare coin identification.

Limitations of manual methods.



Need for an automated system.



Proposed Solution

AI-based system overview

Model architecture

Key features

Methods Used in Our Application

Data Collection and Annotation:

- Collected 100 images of agorot coins.
- Annotated images to mark year stamps for training.

Preprocessing:

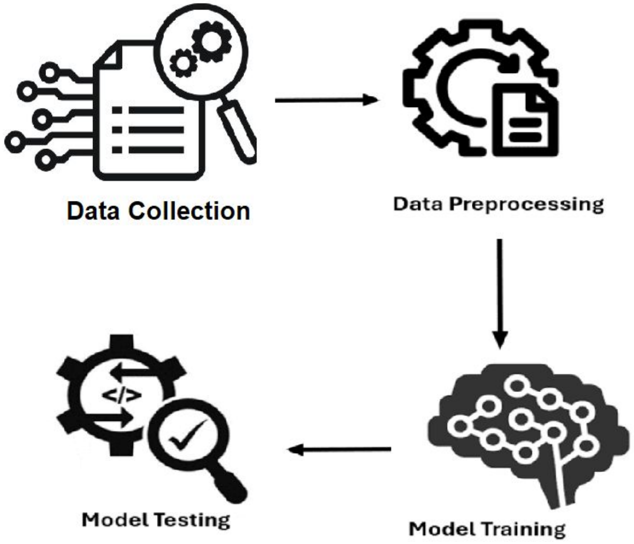
- Applied data augmentation (rotation, scaling, contrast adjustment).
- Used image segmentation to isolate coins from backgrounds.

Model Training:

- Used the YOLO object detection framework.
- Fine-tuned pre-trained YOLO weights with our dataset.

Evaluation and Testing:

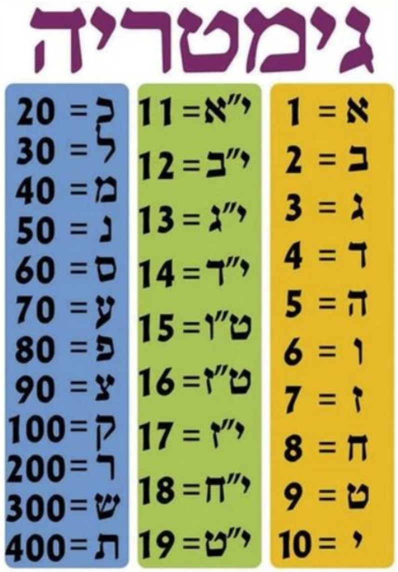
- Measured model performance with precision, recall, and F1 score.
- Tested on unseen data for generalization.
- Conducted real-time testing via video feed.



Converting Hebrew Year to Gregorian Year

Hebrew Letters and Their Numerical Values:

- The first nine letters represent the numbers 1 through 9:
  - א = 1, ב = 2, ג = 3, ד = 4, ה = 5, ו = 6, ז = 7, ח = 8, ט = 9
- The next nine letters represent the tens:
  - י = 10, כ = 20, ל = 30, מ = 40, נ = 50, ס = 60, ע = 70, פ = 80, צ = 90
- The remaining letters represent the hundreds:
  - ק = 100, ר = 200, ש = 300, ת = 400



גימטריה

20 = כ	11 = י"א	1 = א
30 = ל	12 = י"ב	2 = ב
40 = מ	13 = י"ג	3 = ג
50 = נ	14 = י"ד	4 = ד
60 = ס	15 = ט"ו	5 = ה
70 = ע	16 = ט"ז	6 = ו
80 = פ	17 = י"ז	7 = ז
90 = צ	18 = י"ח	8 = ח
100 = ק	19 = י"ט	9 = ט
200 = ר		10 = י
300 = ש		
400 = ת		

Example: תשפ"ד

- 400 = ת
- 300 = ש
- 80 = פ
- 4 = ד

Total: 400+300+80+4=784. The thousands (5) are implied, so the year is 5784.

And now to make it into a civil year , we omit the first digit , and then we add 1240 , in our example is 784 + 1240 = 2024

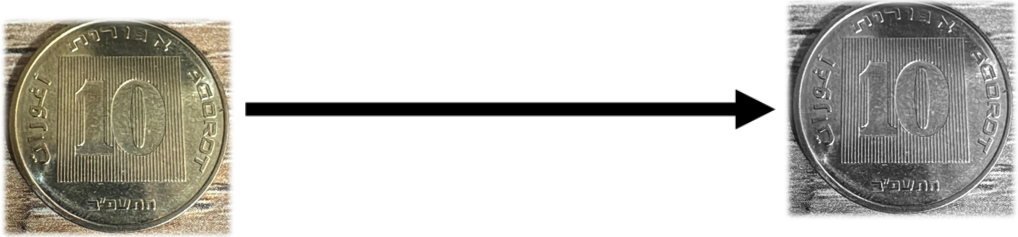
Data Flow in the Coin Detection System

Input:

- User captures an image or starts a video stream via the GUI.

Pre-processing:

- Image or video is pre-processed for optimal detection.



Coin Detection:

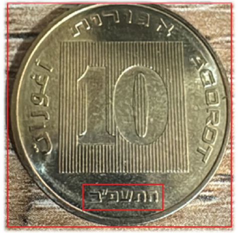
- Detection model identifies coins and extracts Hebrew letters stamped on them.

Classification & Extraction:

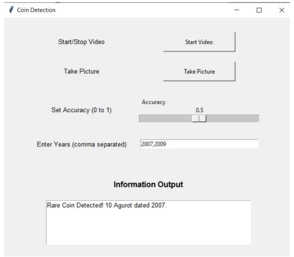
- Coins are classified by rarity, mint year, and other metadata.
- Hebrew year is converted to civil year using the previously explained algorithm.

Output:

- Results are displayed in the console or GUI.



→ התשפ"ב → 2022 →

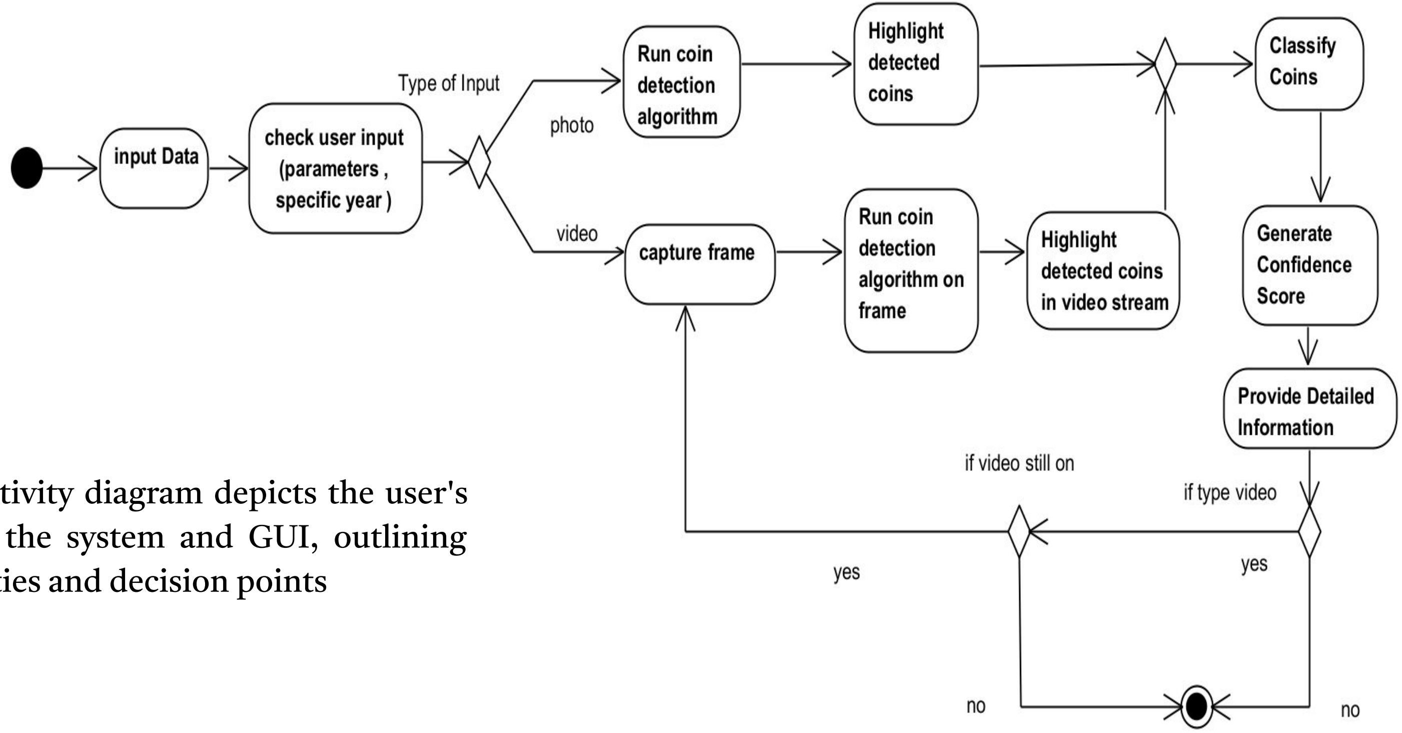


Set Accuracy (0 to 1): 0.5

Enter Years (comma separated): 2007,2009

Rare Coin Detected! 10 Agurot dated 2007.

Activity Diagram

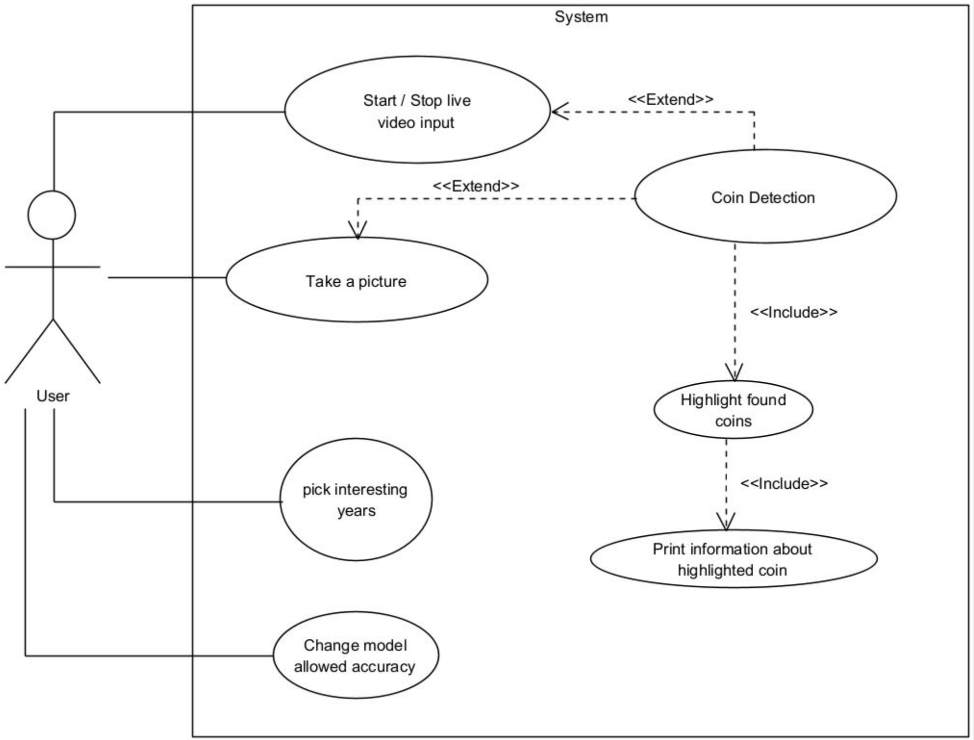


input Data
check user input (parameters , specific year)
Type of Input
photo
video
Run coin detection algorithm
Highlight detected coins
Classify Coins
capture frame
Run coin detection algorithm on frame
Highlight detected coins in video stream
Generate Confidence Score
Provide Detailed Information
if video still on
if type video
yes
yes
no
no

- The following activity diagram depicts the user's interaction with the system and GUI, outlining the flow of activities and decision points

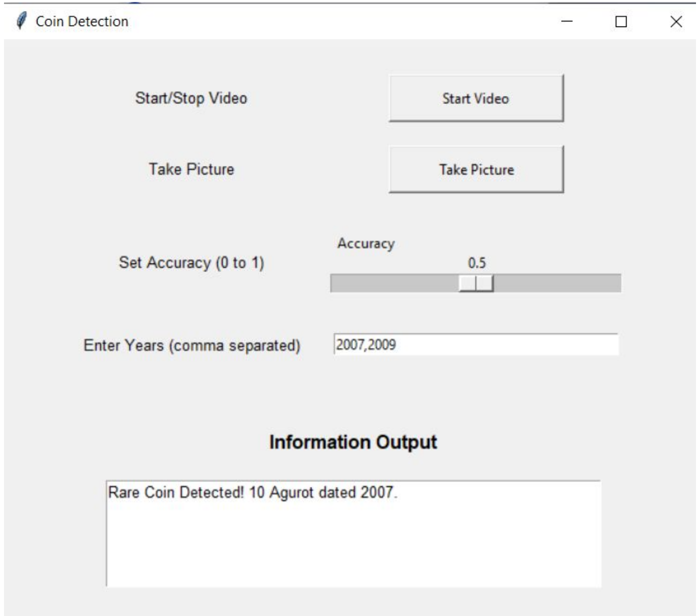
Use case

- The following Use Case diagram shows both the user and his interaction system



GUI

1. A button to start video mode.
2. A button to capture a photo and a button to process the given photo.
3. There will be a text box with the information after processing the coin.
4. In addition to a text box that tells the algorithm which years are needed.
5. A slider which gives the option to tell the algorithm the allowed accuracy of detection.



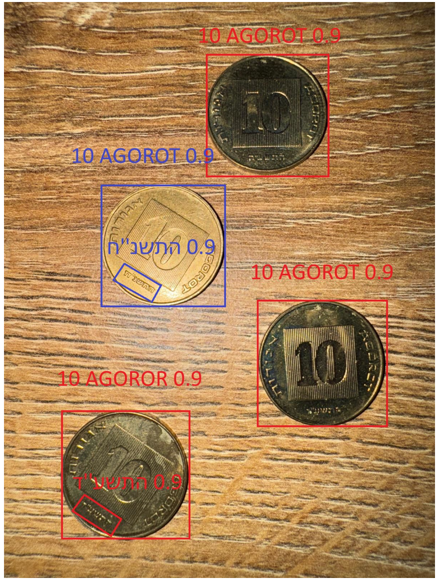
Set Accuracy (0 to 1) 0.5

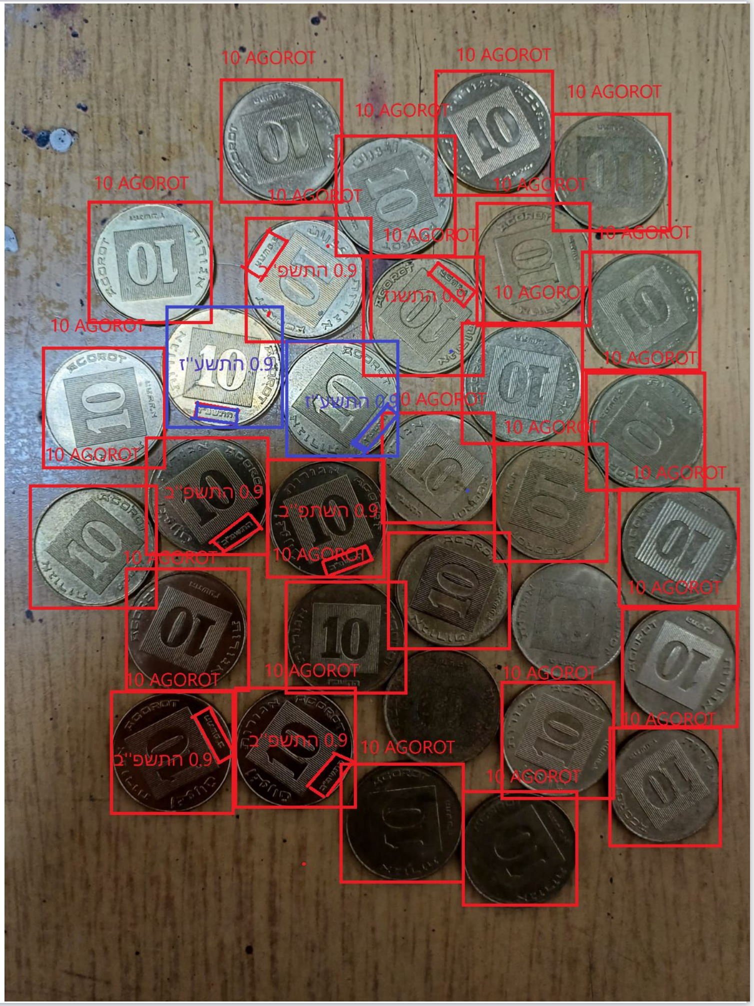
Enter Years (comma separated) 2007,2009

Information Output

Rare Coin Detected! 10 Agurot dated 2007.

An example of the image after our algorithm ran on it , it highlights the coins that it found and also highlights the years of the coins that are required by the user





Thank you for listening!